

## Section12

### OTHER ROCKFISH

by  
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#### CHANGES FROM LAST YEAR'S ASSESSMENT

Relative to last year's final BS/AI SAFE Report, the following substantive changes have been made in the current draft of the Other Rockfish chapter:

- (1) Catch distribution maps from the fishery and survey were created for light dusky rockfish and shortspine thornyhead.
- (2) Revised list of other rockfish species from 28 species to 7 species.
- (3) The 2000 landings have been revised and the 2001 landings through October 12, 2001 have been included in the assessment.
- (4) Length frequency graphs from survey and fishery data have been included for light dusky rockfish and shortspine thornyhead.
- (5) No new biomass estimates for this group were available for the 2002 assessment. Therefore, the recommended ABC's and OFL's for 2002 will be the same as those from 2001 and are as follows:

	Eastern Bering Sea		Aleutian Islands	
	Last Year	This Year	Last Year	This Year
<i>Other Rockfish</i>				
ABC	361 t	361 t	676 t	676 t
OFL	482 t	482 t	901 t	901 t

## OTHER ROCKFISH

by

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### INTRODUCTION

Other rockfish, which includes all species of *Sebastes* and *Sebastolobus* spp. other than Pacific ocean perch (*Sebastes alutus*) and those species in the Other red rockfish complex (northern rockfish, *S. polycarpus*; rougheye rockfish, *S. aleuticus*; shortraker rockfish, *S. borealis*; and sharpchin rockfish, *S. zacentrus*), is one of the rockfish management groups in the Bering Sea and Aleutian Island (BSAI) regions. Seven out of twenty-eight species of “other rockfish” have been confirmed or tentatively identified in catches from the eastern Bering Sea and Aleutian Islands region (Table 12.1). These species have been observed at least once in the BSAI surveys and/or have occurred in at least 1% of the hauls where an species from the other rockfish category has been caught. None of the species within this group are subject to a directed fishery, hence they are mainly caught as bycatch in the directed fisheries in the BSAI. Since 1977, rockfish have been identified to the species level in fishery catches by U.S. observers, this has provided a means of estimating annual harvests of individual species. Of the species in the “other rockfish” group, two species are predominant in both the survey and fishery catches, light dusky rockfish (*S. ciliatus*) and shortspine thornyheads (*Sebastolobus alascanus*).

The distribution of these species is not well documented in the BSAI regions. AFSC research survey catches of light dusky rockfish are found mainly in patches around 125 -200 m throughout the Aleutian Islands though infrequent (Figure 12.1). Catches of shortspine thornyheads, in the Aleutian Island (AI) region are uniformly distributed along the bathymetric contours between 200 m and 500 m, with the exception of Bower’s ridge where they tend to be located on the south side of the Islands (Figure 12.2). Relative to survey catch the catch distributions found are more uniformly distributed for both species (Figure 12.3 and 12.4). Eastern Bering Sea (EBS) light dusky rockfish are rarely encountered in the catches of either the survey or the fishery. Whereas, shortspine thornyheads are found in the survey and fishery catches when tows deeper than 200 m are made and their distribution is similar to that found in the AI (Figure 12.4).

Stock structure of these two species is not well understood in the BSAI regions. Currently, for management purposes, it is assumed that the other rockfish complex are two separate stocks in the EBS and AI regions and therefore assessed as such. It is possible to also assume though, based on just the catch distributions, that the light dusky rockfish stock may be similar for the entire BSAI region. This is plausible because the catch of light dusky rockfish in the EBS does not extend north of the Aleutian archipelago (Reuter, unpublished data). It must be noted though that the survey gear used in the EBS and the AI are different thus sampling of certain species may be biased. As for the stock structure of shortspine thornyhead it is a conservative assumption to denote two separate stocks in the BSAI regions.

### CATCH HISTORY

Historical catches of other rockfish since implementation of the MFCMA are shown in Table 12.2. Catches prior to 1990 are assumed to include discards; whereas, catches during the period 1990-2000 explicitly account for discards based on NMFS Regional Office and observer information. The peak catch of other rockfish in the EBS occurred in 1978 with a removal of 2,600 t. In the Aleutian region, peak catch occurred in 1979 with a harvest of 4,500 t. Note that before 1979 the other rockfish category included northern,

sharpchin, roughey and shortraker rockfish. Therefore, the revised removals for 1978 is 941 t for the EBS and the 1979 removals in the AI are 1,039 t, changing the peak catch to 1982 where the catch was 2,114 t.

The species in this group are mainly caught unintentionally (bycatch) in the directed fisheries using a variety of gear types within the BSAI regions. In recent years in both the Aleutian Islands (AI) and eastern Bering Sea (EBS), the bulk of the other rockfish catch was comprised of light dusky rockfish and shortspine thornyheads (Table 12.3). These catches were extrapolated from samples taken by fishery observers (Note: this is not the total harvest for this group). Figure 12.5a illustrates that in the AI light dusky rockfish account for 50% (1997) to 80% (2001) of the other rockfish catch. Whereas in the EBS, shortspine thornyhead account for 60% (1998) to 80% (2001) of the other rockfish catch (Figure 12.5b).

The target fisheries that catch these two species are described in Table 12.4. These target fisheries are defined by which species or species group makes up at least 75% of the catch. During 1999 and 2000 in the AI, 65% to 80% of the total light dusky rockfish catch was caught during the Atka mackerel trawl fishery and 40% to 50% of the total shortspine thornyhead catch was caught using longline gear in hauls whose target we describe as “other fish”. It should be noted that the species that make up this “other fish” category are grenadiers and/or skates. During the same years in the EBS, light dusky rockfish bycatch was found in notable quantities in the Atka mackerel bottom trawl fishery, the Pollock pelagic trawl fishery and the Pacific cod longline fishery. Shortspine thornyhead bycatch was found mainly in the Arrowtooth/Kamchatka flounder bottom trawl fishery and the Greenland turbot longline fishery.

## ASSESSMENT METHODS

### Abundance Estimation

Commercial catch and effort data are of little use in examining trends in abundance for other rockfish. Since this group is primarily bycatch in other directed fisheries, standardization of commercial effort data is complex, particularly given the current multispecies management practices. For shortspine thornyheads, however, an index of abundance may be provided from data from the longline survey conducted by the Auke Bay Lab (Ianelli and Gaichas 1999) and future analysis should be performed to determine the feasibility of incorporating those data into this assessment.

A number of past trawl surveys provide estimates of exploitable biomass for the EBS and AI regions. The 1979-86 cooperative U.S.-Japan trawl surveys in the EBS were conducted both on the continental shelf and slope, but almost all catches of other rockfish were taken by Japanese research trawlers working the difficult to fish slope regions at depths exceeding 200 m. For this reason, only data collected by Japanese research vessels were employed to calculate other rockfish abundance estimates for those years. In 1991 trawl surveys were conducted in both the EBS and Aleutian regions. These surveys, however, were conducted entirely by domestic trawlers and did not include participation by the deeper-water Japanese research trawlers. The most recent trawl surveys occurred in 1991, 1994, 1997 and 2000 in the Aleutian Islands region, and biomass for these surveys was re-estimated in 2000 with more accurate area estimates of the survey's strata. Although a slope survey of the EBS was conducted in 2000 the biomass results will not be used in assessments because it is still in an experimental phase. It should be noted though, that results from a standardized slope survey would yield better biomass estimates for shortspine thornyhead.

## ABUNDANCE AND EXPLOITATION TRENDS

Biomass estimates for other rockfish were produced from cooperative U.S.-Japan trawl surveys from 1979-1985 on the eastern Bering Sea slope, and from 1980-1986 in the Aleutian Islands. U.S domestic trawl surveys were conducted in 1988 and 1991 on the eastern Bering Sea slope, and in 1991, 1994, 1997, and 2000 in the Aleutian Islands (Table 12.5). The biomass for the EBS group of other rockfish is comprised of 2 components--the EBS shelf-slope component and the Aleutian component of Bering Sea area 1 (Table 12.5).

The variances of the point estimates were large, making it almost impossible to determine any statistically significant changes in biomass from one survey year to the next (Table 12.5). The large change in biomass estimates from the 1979-1986 to the 1991-2000 surveys are probably due to the differences in vessel type, gear type and survey methodology. It appears, though, that the biomass estimates from each group of surveys are consistent. Regional biomass differences, from past surveys, between the AI and EBS suggests that the amount of essential habitat for these species of rockfish is greater along the slope area of the AI. It is with this information that we determined that regional biomass estimates be calculated. In the AI the exploitable biomass estimate is the average of the most recent surveys, in this year's stock assessment those are the 1991, 1994, 1997 and 2000 AI surveys. The EBS is divided into two areas when determining the biomass of the other rockfish category. The two areas are; the shelf/slope area, which has not had a biomass estimate since 1991 and the area that is labeled the AI portion of the southern EBS, whose biomass estimate is attained on those years when the AI survey occurs (Table 12.5). For the latter portion of the EBS the exploitable biomass estimate that is used in this assessment is the average of the most recent surveys (1991, 1994, 1997 and 2000).

Recent survey data indicate that shortspine thornyhead, light dusky rockfish and harlequin rockfish make up the bulk of the survey catches of other rockfish. The most recent survey estimates indicate that ~ 90% of the other rockfish biomass is comprised of shortspine thornyhead (Table 12.6). The proportion of light dusky rockfish in the survey estimates is considerably lower than those in the catch estimates from the fishery. This discrepancy suggests that the distribution of effort by the fishery, among other things, is different than that of the survey. For instance, the majority of the light dusky catch is by the Atka mackerel fishery at depths less than 200 m, whereas the catch of shortspine thornyheads is by longline and trawl fisheries whose targets are in water deeper than 200 m (Table 4). This suggests that light dusky rockfish and shortspine thornyheads occur in different habitats therefore surveys that do not sample all habitats equally will obtain species compositions that bias towards those habitats it can be adequately sampled.

### Length frequency

Length frequency graphs show that the composition of the available population to both the fishery and the survey is fairly consistent throughout the years. Although infrequently encountered during the AI surveys the length frequency graphs of light dusky rockfish consistently show that mainly specimens over 30 cm are selected with this gear type (Figure 12.6). Shortspine thornyhead length frequency from the AI trawl survey show a consistent representation of the population between 20 and 50 cm (Figure 12.7). Similar length frequency graphs for shortspine thornyhead are given from the EBS slope surveys (Figure 12.8). Length data from the fishery is limited for light dusky rockfish due to it's status, set by the AFSC Observer program, as a low priority species for taking measurements. Therefore the length frequency graphs that are shown in Figure 12.9a do not give a good representation of the exploited population. The exploited portion of the population of shortspine thornyhead in the BSAI region are adequately represented and Figure 12.9b shows that individuals between 30 cm and 60 cm are consistently caught by the fishery. The available data do not span a long enough time period to detect any strong year-classes.

Exploitation rates were calculated using fishery catch and biomass estimates from the AI and EBS bottom trawl surveys (Table 12.9). The author cautions that these exploitation rates may not be representative because the bottom trawl surveys do not adequately sample the habitats of these species.

Based upon available information, the "best" estimate of exploitable biomass for other rockfish is 6,884 t in the EBS and 12,875 t in the Aleutian Islands.

#### REFERENCE FISHING MORTALITY RATES AND YIELDS

Information is lacking to calculate reference fishing mortality rates and yields that directly conserve spawning stock biomass. We therefore employ a proxy  $F=M$  strategy to determine ABC. The value of  $M$  (0.07), represents an approximation based on knowledge of rockfish life histories from other areas. This value is based on the estimate for shortspine thornyheads (Ianelli and Ito 1994) since this species evidently comprises well over 90% of the other rockfish biomass (as calculated by survey data).

Under tier 5 of Amendment 44, a fishing mortality rate equal to 75% of the natural mortality rate is the maximum allowable  $F$  (ABC) value. Therefore, the estimate of ABC for the eastern Bering Sea region is 361 t ( $0.75 \times 0.07 \times 6,884$ ) and 676 t ( $0.75 \times 0.07 \times 12,875$ ) for the Aleutian Islands region.

Based on the overfishing definition, the overfishing level (OFL) is computed assuming  $F_{OFL} = M$ . Thus, the overfishing level for the eastern Bering Sea region is 482 t and 901 t for the Aleutian Islands region.

#### SUMMARY

A summary of the estimates of current exploitable biomass and ABC for the other rockfish group in the EBS and Aleutian Islands region is provided in the following table:

Region	Exploitable biomass (t)	ABC (t)	OFL (t)
Eastern Bering Sea	6,884	361	482
Aleutian Islands Region	12,875	676	901

#### REFERENCES

- Ianelli, J. N., and D. H. Ito. 1994. Status of the thornyhead (*Sebastolobus sp.*) resource in 1994. *In*: Stock assessment and fishery evaluation report of the Gulf of Alaska as projected for 1995 (November 1994), 26 pp. North Pacific Fishery Management Council, P.O. Box 103136, Anchorage, AK 99510.
- Ianelli, J.N., and S. Gaichas. 1999. Thornyheads. *In*: Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska as projected for 2000. Nov. 1999. North Pacific Fishery Management Council, P.O Box 103136, Anchorage, AK 99510.

Table 1. The common and scientific names of rockfish in the “other rockfish” reporting category identified, 1990 - present, by AFSC research surveys (at least one observation) and U.S. fishery observers (greater than 1% of hauls) in the eastern Bering Sea and Aleutian Islands regions. (~ = none observed, percent of hauls where other rockfish occurred)

		EBS		AI	
		Survey	Fishery	Survey	Fishery
Dark dusky rockfish	<i>cf. ciliatus</i>	~	1%	4%	3%
Light dusky rockfish	<i>Sebastes ciliatus</i>	18%	40%	22%	46%
Harlequin rockfish	<i>Sebastes variegatus</i>	~	1%	9%	5%
Red banded rockfish	<i>Sebastes babcocki</i>	~	<1%	1%	<1%
Redstripe rockfish	<i>Sebastes proriger</i>	~	1%	~	1%
Yelloweye rockfish (rasphead)	<i>Sebastes ruberrimus</i>	~	1%	0.3%	1%
<b>Shortspine thornyhead</b>	<b><i>Sebastolobus alascanus</i></b>	<b>62%</b>	<b>44%</b>	<b>61%</b>	<b>34%</b>
Aurora rockfish	<i>Sebastes aurora</i>	~	~	~	0.01%
Black rockfish	<i>Sebastes melanops</i>	~	0.77%	~	0.31%
Blackgill rockfish	<i>Sebastes melanostomus</i>	~	0.03%	~	0.14%
Blue rockfish	<i>Sebastes mystinus</i>	~	0.16%	~	0.02%
Boccaccio	<i>Sebastes paucispinis</i>	~	0.06%	~	0.04%
Canary rockfish	<i>Sebastes pinniger</i>	~	0.01%	~	~
Chillipepper rockfish	<i>Sebastes goodei</i>	~	0.04%	~	0.03%
Copper rockfish	<i>Sebastes caurinus</i>	~	~	~	0.03%
Dark blotched rockfish	<i>Sebastes crameri</i>	~	0.46%	~	0.38%
Greenstriped rockfish	<i>Sebastes elongatus</i>	~	0.04%	~	~
Pygmy rockfish	<i>Sebastes wilsoni</i>	~	~	~	~
Rosethorn rockfish	<i>Sebastes helvomaculatus</i>	~	~	~	~
Silvergray rockfish	<i>Sebastes brevispinis</i>	~	0.19%	~	0.05%
Splitnose rockfish	<i>Sebastes diploproa</i>	~	0.07%	~	0.07%
Stripetail rockfish	<i>Sebastes saxicola</i>	~	~	~	~
Tiger rockfish	<i>Sebastes nigrocinctus</i>	~	~	~	~
Vermillion rockfish	<i>Sebastes miniatus</i>	~	~	~	0.01%
Widow rockfish	<i>Sebastes entomelas</i>	~	~	~	~
Yellowmouth rockfish	<i>Sebastes reedi</i>	~	0.48%	~	0.17%
Yellowtail rockfish	<i>Sebastes flavidus</i>	~	0.17%	~	0.02%
Longspine thornyhead	<i>Sebastolobus altivelis</i>	~	0.27%	~	0.16%

Table 2.--Summary of catches (t) of other rockfish in the eastern Bering Sea and Aleutian Islands regions. Source: NMFS/AK regional website.

Year	Eastern Bering Sea				Aleutian Islands			
	Foreign	Domestic		Total	Foreign	Domestic		Total
		JVP	DAP			JVP	DAP	
1977**	112	--	--	112	700	--	--	700
1978**	941	--	--	941	212	--	--	212
1979**	759	--	--	759	1,039	--	--	1,039
1980	456	3	--	459	420	--	--	420
1981	331	--	25	356	328	--	--	328
1982	262	11	3	276	2,114	--	--	2,114
1983	212	8	--	220	1,041	4	--	1,045
1984	121	8	47	176	42	14	--	56
1985	33	3	56	92	2	14	83	99
1986	4	12	86	102	Tr	15	154	169
1987	3	4	467	474	0	6	141	147
1988	0	8	333	341	0	68	210	278
1989	0	4	188	192	0	0	481	481
1990	0	0	418	418	0	0	858	858
1991	0	0	422	422	0	0	343	343
1992	0	0	600	600	0	0	664	664
1993	0	0	192	192	0	0	496	496
1994	0	0	133	133	0	0	292	292
1995	0	0	288	288	0	0	219	219
1996	0	0	170	170	0	0	282	282
1997	0	0	163	163	0	0	305	305
1998	0	0	188	188	0	0	364	364
1999	0	0	135	135	0	0	631	631
2000	0	0	232	232	0	0	563	563
2001(1)	0	0	278	278	0	0	569	569

\*\*These biomass estimates were revised (2001) to show the catch of those species currently in the other rockfish category.

(1) Estimated removals through October 12, 2001.

Table 3. Observed fishery catch (t) of top species in other rockfish group in the Aleutian Islands and eastern Bering Sea from 1997-2001. Source: North Pacific Observer Database AFSC Seattle WA.

### Aleutian Islands

<b>2001*</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Total</b>
Light Dusky	81	33	15	<b>129</b>
Rockfish unid.	5	3	42	<b>50</b>
Shortspine	12	11	5	<b>28</b>
Harlequin	1	7	6	<b>14</b>
Thorny unid.	7	< 1	< 1	<b>7</b>
<b>Total</b>	<b>106</b>	<b>54</b>	<b>68</b>	<b>228</b>

<b>2000</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Total</b>
Light Dusky	192	65	6	<b>263</b>
Shortspine	46	22	19	<b>87</b>
Rockfish unid.	6	26	2	<b>34</b>
Harlequin	12	14	2	<b>28</b>
Redstripe	<1	<1	8	<b>8</b>
<b>Total</b>	<b>256</b>	<b>127</b>	<b>37</b>	<b>420</b>

<b>1999</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Total</b>
Light Dusky	158	27	7	<b>191</b>
Rockfish unid.	105	13	2	<b>120</b>
Shortspine	24	21	16	<b>61</b>
Redstripe	<1	18	29	<b>47</b>
Harlequin	2	6	13	<b>21</b>
Thorny unid.	8	9	3	<b>20</b>
Dark Dusky	5	9	3	<b>17</b>
<b>Total</b>	<b>302</b>	<b>103</b>	<b>73</b>	<b>477</b>

<b>1998</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Total</b>
Light Dusky	84	20	3	<b>107</b>
Shortspine	28	21	6	<b>55</b>
Rockfish unid.	6	0	31	<b>37</b>
Harlequin	1	11	7	<b>19</b>
Small red	0	0	10	<b>10</b>
Rockfish group	0	8	0	<b>8</b>
<b>Total</b>	<b>119</b>	<b>60</b>	<b>57</b>	<b>236</b>

<b>1997</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Total</b>
Shortspine	24	15	35	<b>74</b>
Light Dusky	60	11	2	<b>73</b>
Harlequin	<1	4	5	<b>9</b>
Rockfish unid.	3	<1	0	<b>3</b>
<b>Total</b>	<b>87</b>	<b>30</b>	<b>42</b>	<b>159</b>

### Eastern Bering Sea

<b>2001*</b>	<b>No. Bering Sea</b>	<b>So. Bering Sea (517-519)</b>	<b>Total</b>
Shortspine thornyhead	7	91	<b>98</b>
Light Dusky	3	11	<b>14</b>



Thorny unid.	2	5	7
Rockfish unid.	1	3	4
<b>Total</b>	<b>13</b>	<b>110</b>	<b>123</b>
<b>2000</b>	<b>No. Bering Sea</b>	<b>So. Bering Sea (517-519)</b>	<b>Total</b>
Shortspine thornyhead	13	71	84
Light Dusky	6	11	17
Rockfish unid.	10	2	12
broad banded thorny.	4	< 1	4
dark dusky	2	2	4
<b>Total</b>	<b>35</b>	<b>86</b>	<b>121</b>
<b>1999</b>	<b>No. Bering Sea</b>	<b>So. Bering Sea (517-519)</b>	<b>Total</b>
Shortspine thornyhead	10	28	38
Light Dusky	2	16	18
Rockfish unid.	3	3	6
Small Red Rockfish Group	<1	3	3
Thornyhead unid.	1	3	4
<b>Total</b>	<b>16</b>	<b>53</b>	<b>69</b>
<b>1998</b>	<b>No. Bering Sea</b>	<b>So. Bering Sea (517-519)</b>	<b>Total</b>
Shortspine thornyhead	19	44	63
Light Dusky	14	18	32
Rockfish unid.	1	2	3
Black rockfish	5	<1	5
Thornyhead unid.	1	2	3
<b>Total</b>	<b>40</b>	<b>66</b>	<b>106</b>
<b>1997</b>	<b>No. Bering Sea</b>	<b>So. Bering Sea (517-519)</b>	<b>Total</b>
Shortspine thornyhead	11	45	56
Light Dusky	5	12	17
Redstripe rockfish	2	<1	2
Rockfish unid.	1	1	2
Thornyhead unid.	0	2	2
<b>Total</b>	<b>19</b>	<b>60</b>	<b>79</b>

\* Observed catch through October 12<sup>th</sup> 2001

Table 4. Catch (t) of Light dusky rockfish and Shortspine thornyhead by target fishery and gear type for 2000 and 1999. Source: NorPac Database AFSC Seattle WA.

**2000**

**Aleutian Islands**

**Light dusky rockfish**

Target fishery	Geartype			Total
	Trawl	Pot	Longline	
Atka mackerel	167	0	0	167
POP	35	0	0	35
P. Cod	11	< 1	19	30
Northern	26	0	0	26
<b>Total</b>	<b>239</b>	<b>&lt; 1</b>	<b>19</b>	<b>258</b>

**Shortspine thornyhead**

Target fishery	Geartype			Total
	Trawl	Pot	Longline	
Other fish*	0	< 1	34	34
Greenland Turbot	0	0	18	18
POP	17	0	< 1	17
Sablefish	0	< 1	14	14
<b>Total</b>	<b>17</b>	<b>&lt; 1</b>	<b>66</b>	<b>83</b>

**Eastern Bering Sea**

**Light dusky rockfish**

Target fishery	Gear type				Total
	Bottom trawl	Pelagic trawl	Pot	Longline	
Pacific Cod	2	< 1	< 1	4	6
Pollock	< 1	4.5	0	0	4.5
POP	2.5	0	0	0	2.5
Northern	2	0	0	0	2
<b>Total</b>	<b>6.5</b>	<b>4.5</b>	<b>&lt; 1</b>	<b>4</b>	<b>15</b>

**Shortspine thornyhead**

Target fishery	Gear type				Total
	Bottom Trawl	Pelagic trawl	Pot	Longline	
Arrowtooth/ Kamchatka	29	0	< 1	1.5	30.5
Greenland Turbot	13	0	< 1	14	27
Other fish*	7	0	< 1	7	14
Pollock	< 1	7	0	0	7
Shortraker rockfish	2	0	0	0	2
Shortspine thorny.	1	0	0	0	1
<b>Total</b>	<b>52</b>	<b>7</b>	<b>&lt; 1</b>	<b>22.5</b>	<b>81.5</b>

\*Other fish target made up mainly of grenadiers and/or skates

**1999**

**Aleutian Islands**

**Light dusky rockfish**

Target fishery	Geartype			Total
	Trawl	Pot	Longline	
Atka mackerel	149	0	0	149
P. Cod	22	< 1	11	33
Northern	3	0	0	3
POP	5	0	0	5
<b>Total</b>	<b>179</b>	<b>&lt; 1</b>	<b>11</b>	<b>190</b>

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#### Shortspine thornyhead

Target fishery	Geartype			Total
	Trawl	Pot	Longline	
Other fish*	0	< 1	30	30
POP	18	0	0	18
Sablefish	0	< 1	8	8
Greenland Turbot	0	< 1	3	3
<b>Total</b>	<b>18</b>	<b>&lt; 1</b>	<b>41</b>	<b>59</b>

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#### Eastern Bering Sea

##### Light dusky rockfish

Target fishery	Gear type				Total
	Bottom trawl	Pelagic trawl	Pot	Longline	
Atka mackerel	6	0	0	0	6
Pollock	1	4	0	0	5
Cod	1	0	< 1	3	4
<b>Total</b>	<b>8</b>	<b>4</b>	<b>&lt; 1</b>	<b>3</b>	<b>15</b>

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#### Shortspine thornyhead

Target fishery	Gear type				Total
	Bottom trawl	Pelagic trawl	Pot	Longline	
Greenland Turbot	4	0	< 1	13	17
Arrowtooth/ Kamchatka	9	0	< 1	1	10
Other fish*	< 1	0	0	9	9
Sablefish	< 1	0	< 1	1	1
<b>Total</b>	<b>13</b>	<b>0</b>	<b>&lt; 1</b>	<b>24</b>	<b>37</b>

\*Other fish target made up mainly of grenadiers and/or skates

Table 5. Estimated biomass (t) of "other rockfish" from the NMFS bottom trawl surveys.

	Eastern Bering Sea (EBS)		
	EBS shelf/slope	Aleutians portion of EBS Area 1	Aleutian Region
1979	3,251	--	--
1980	--	1,095	19,078
1981	4,975	--	--
1982	4,381	--	--
1983	--	1,696	15,995
1984	--	--	--
1985	5,127	--	--
1986	--	5,187	20,336
1987	--	--	--
1988	8,759	--	--
1989	--	--	--
1990	--	--	--
1991	4,529	246	7,654
1992	--	--	--
1993	--	--	--
1994	--	1,171	6,449
1995	--	--	--
1996	--	--	--
1997	--	1,683	9,539
1998	--	--	--
1999	--	--	--
2000	--*	922	11,072
2001	--	--	--

\*Biomass estimates from the 2000 EBS slope survey will not be used in stock assessment.

Table 6. Biomass estimates (t) of the main species from the other rockfish group caught during the most recent Aleutian Islands surveys; by species, year and management area.

<b>2000</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Southern BS</b>	<b>total BSAI</b>
Shortspine thornyheads	522	3,815	5,476	876	10,689
Light Dusky	468	579	186	46	1,279
Harlequin	8	15	3	0	26
<b>Total</b>	<b>AI</b>	<b>11,072</b>	<b>SBS</b>	<b>922</b>	<b>11,994</b>

<b>1997</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Southern BS</b>	<b>total BSAI</b>
Shortspine thornyheads	159	2,011	6,726	1,545	10,441
Light Dusky	442	78	54	138	712
Harlequin	5	53	10	0	68
<b>Total</b>	<b>AI</b>	<b>9,538</b>	<b>SBS</b>	<b>1,683</b>	<b>11,221</b>

<b>1994</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Southern BS</b>	<b>total BSAI</b>
Shortspine thornyheads	187	1,554	4,499	1,071	7,311
Light Dusky	7	52	132	99	290
Harlequin	5	12	1	2	20
<b>Total</b>	<b>AI</b>	<b>6,449</b>	<b>SBS</b>	<b>1,172</b>	<b>7,621</b>

<b>1991</b>	<b>E</b>	<b>C</b>	<b>W</b>	<b>Southern BS</b>	<b>total BSAI</b>
Shortspine thornyheads	118	1,815	5,143	187	7,264
Light Dusky	127	417	12	58	614
Harlequin	2	15	4	0	21
<b>Total</b>	<b>AI</b>	<b>7,654</b>	<b>SBS</b>	<b>245</b>	<b>7,899</b>

Table 7. Exploitation rates for Light dusky rockfish and Shortspine thornyheads in the Aleutian Islands and Eastern Bering Sea regions.

***Eastern Bering Sea***

	<b>Light Dusky rockfish</b>			<b>Shortspine Thornyhead</b>		
	biomass (t)	Catch (t)	exp. rate	biomass (t)	Catch (t)	exp. rate
1997	138	15.27	0.11	1545	55.81	0.04
1998	138	30.86	0.22	1545	62.15	0.04
1999	46	17.03	0.37	876	38.52	0.04
2000	46	16.11	0.35	876	83.55	0.10
2001*	46	6.92	0.15	876	63.19	0.07

***Aleutian Islands***

	<b>Light Dusky rockfish</b>			<b>Shortspine Thornyhead</b>		
	biomass (t)	Catch (t)	exp. rate	biomass (t)	Catch (t)	exp. rate
1997	574	72.87	0.13	8896	73.84	0.01
1998	574	107.04	0.19	8896	107.04	0.01
1999	1232	190.57	0.15	9813	190.57	0.01
2000	1232	263.10	0.21	9813	263.10	0.01
2001*	1232	114.09	0.09	9813	0.00	0.00

\*Data as of October 12<sup>th</sup> 2001

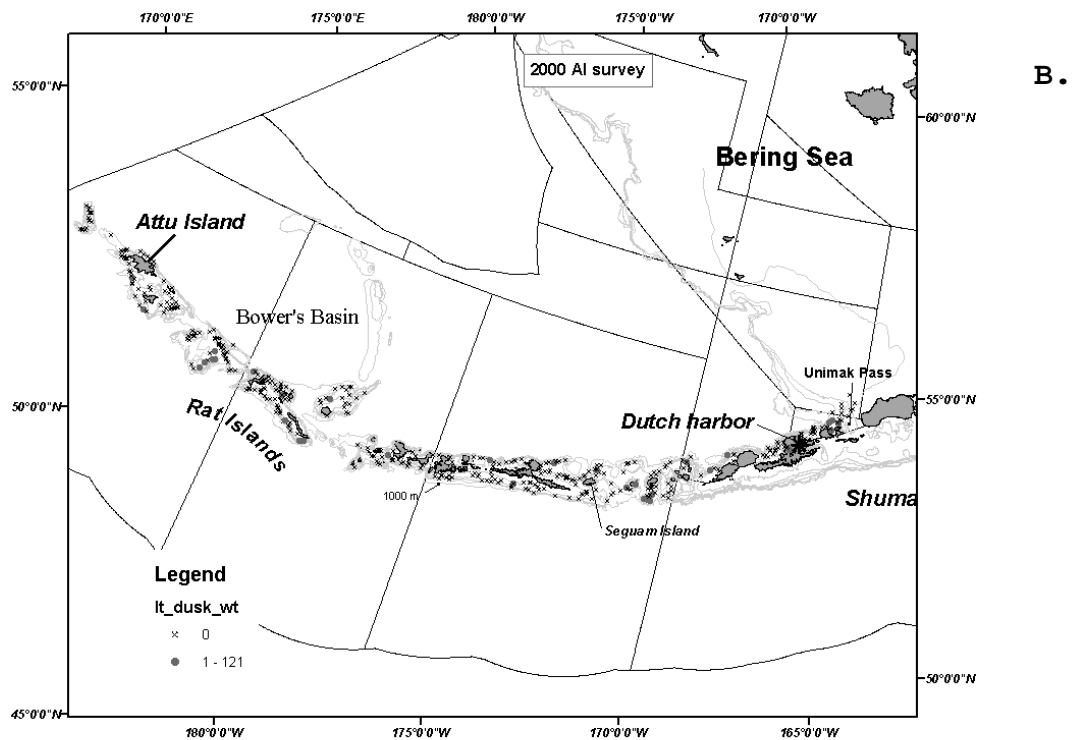
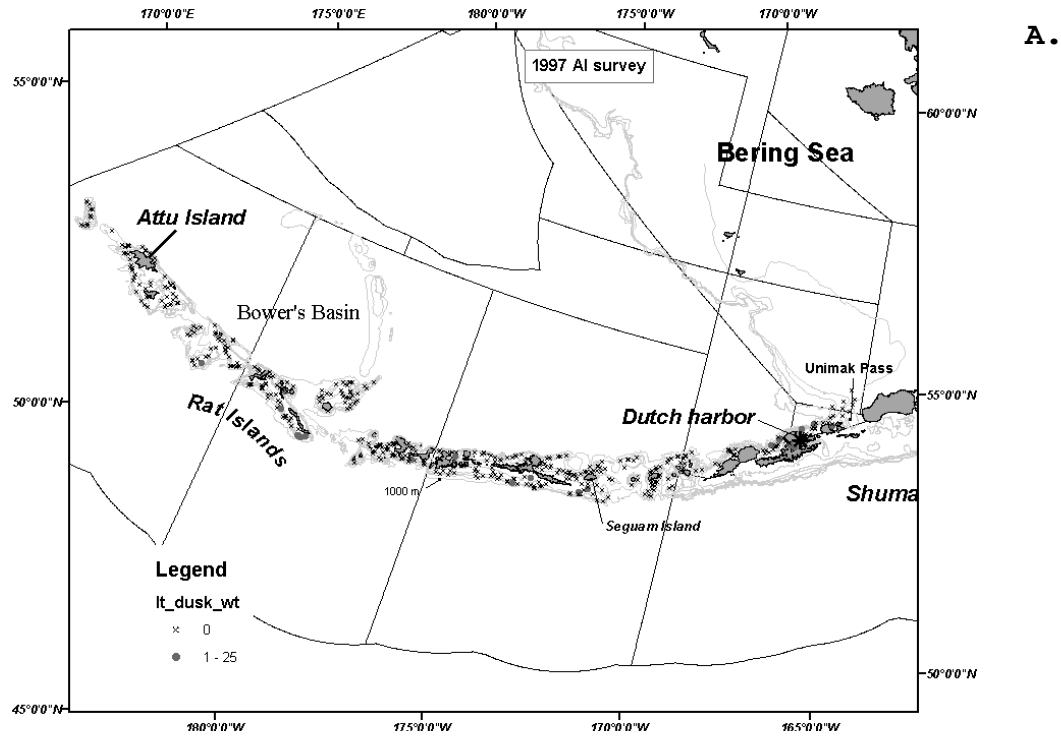


Figure 1. Locations in the Aleutian Islands where light dusky rockfish were found during A. 1997 and B. 2000, AFSC research surveys.

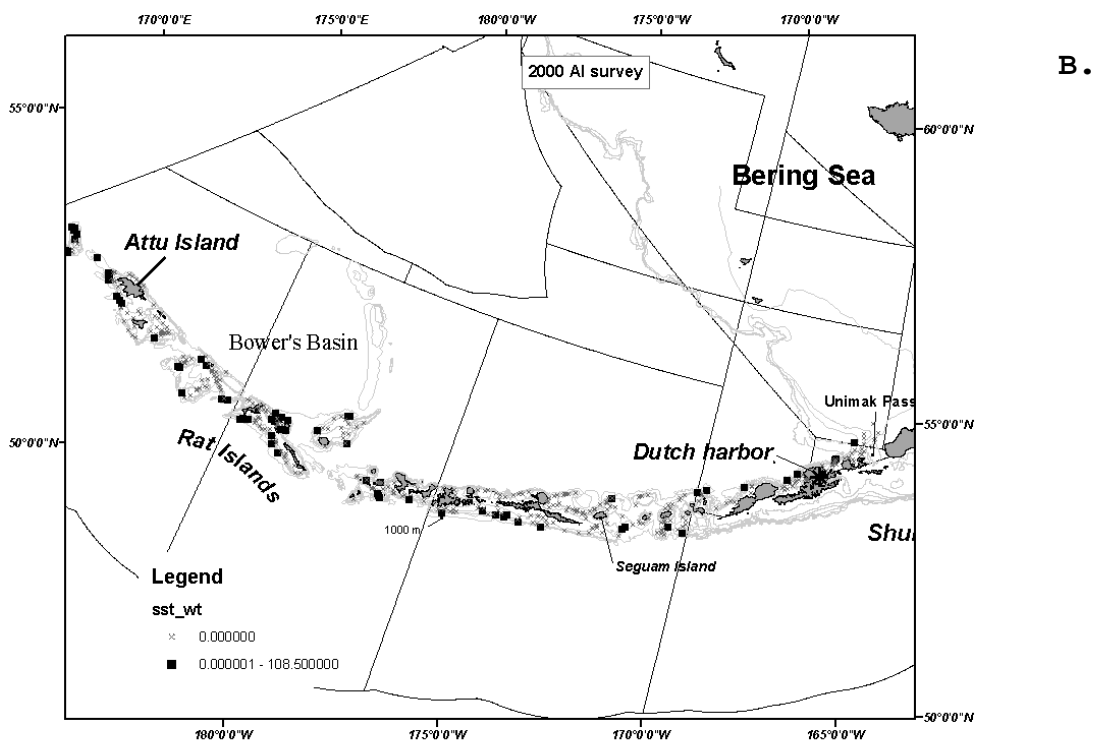
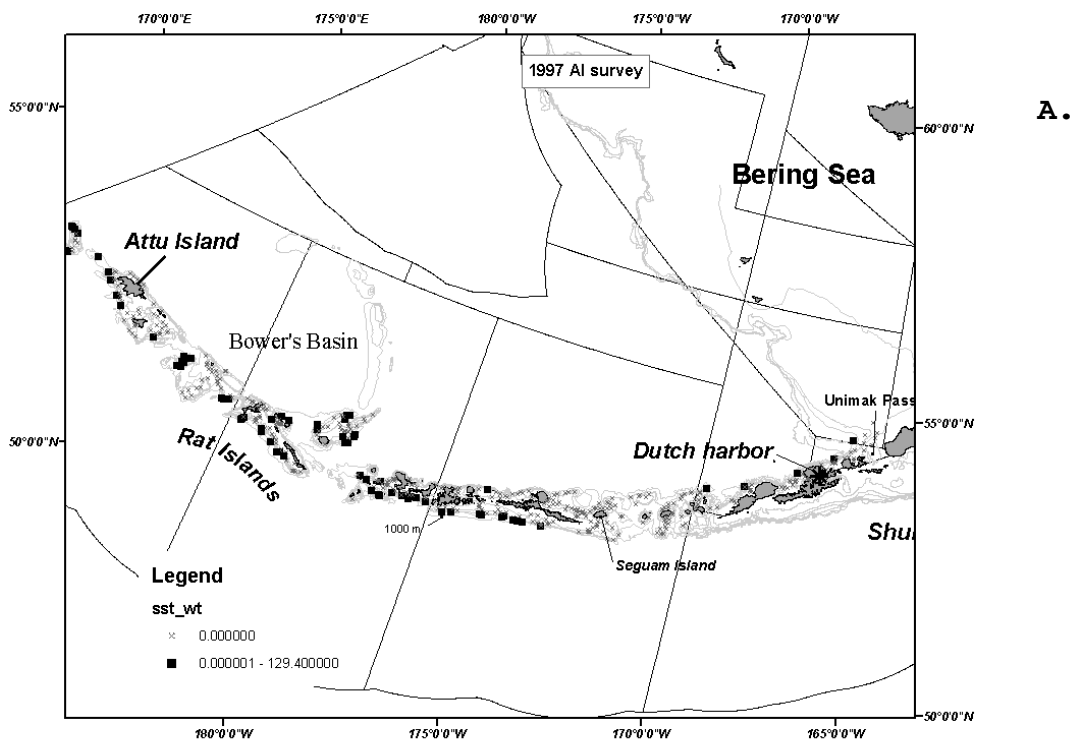


Figure 2. Locations in the Aleutian Islands where shortspine thornyhead were found during A. 1997 and B. 2000, AFSC research surveys.



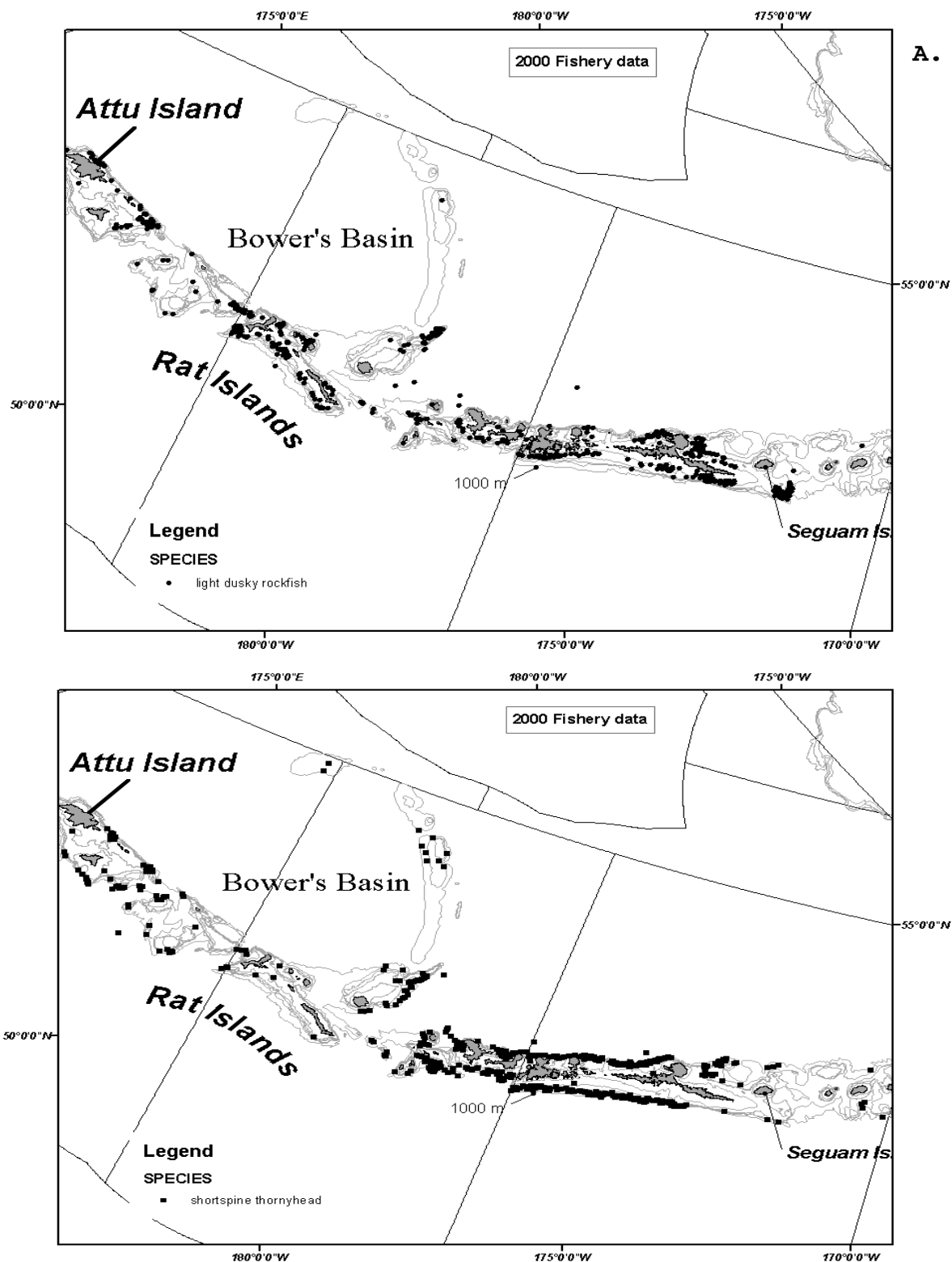


Figure 3. Location where A. Light dusky rockfish and B. Shortspine thornyhead were found during the 2000 fisheries.  
 Source: NorPac Database AFSC Seattle WA.

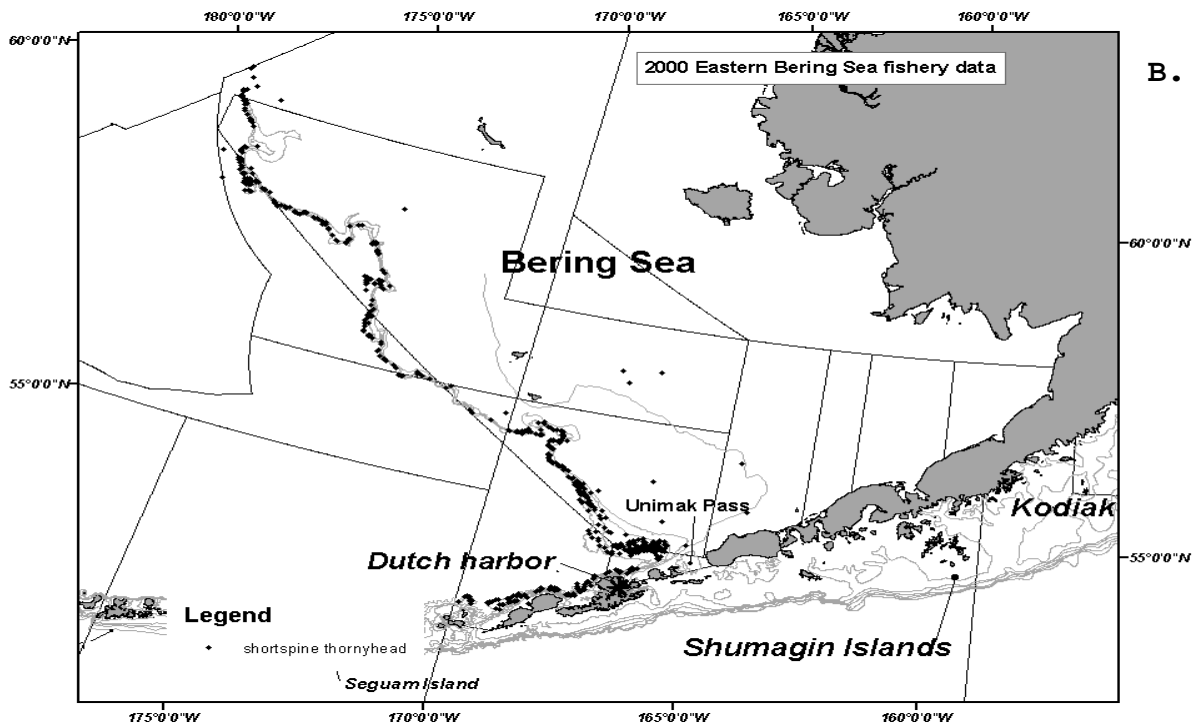
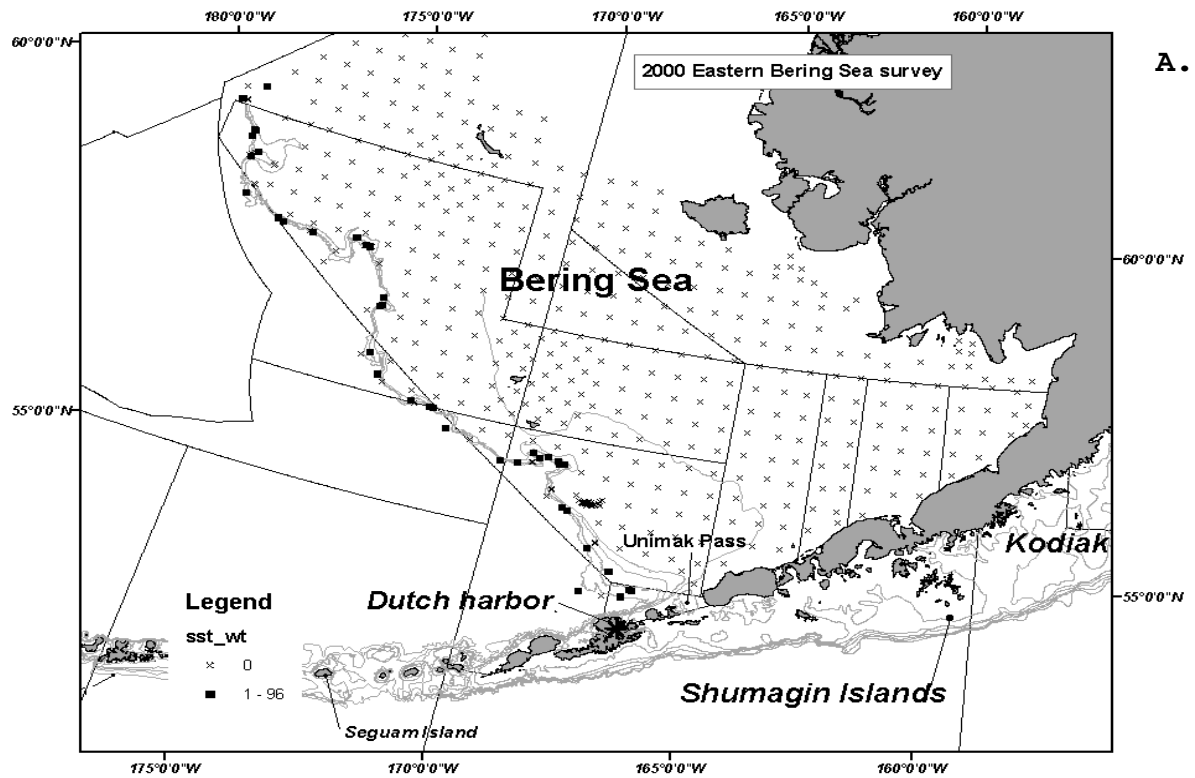
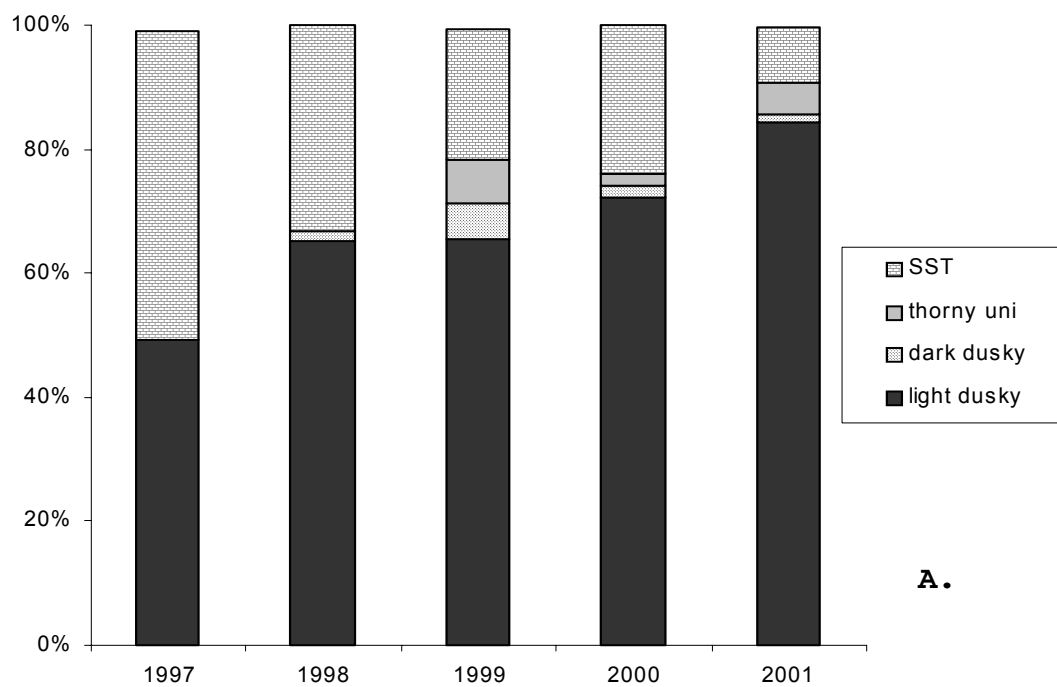
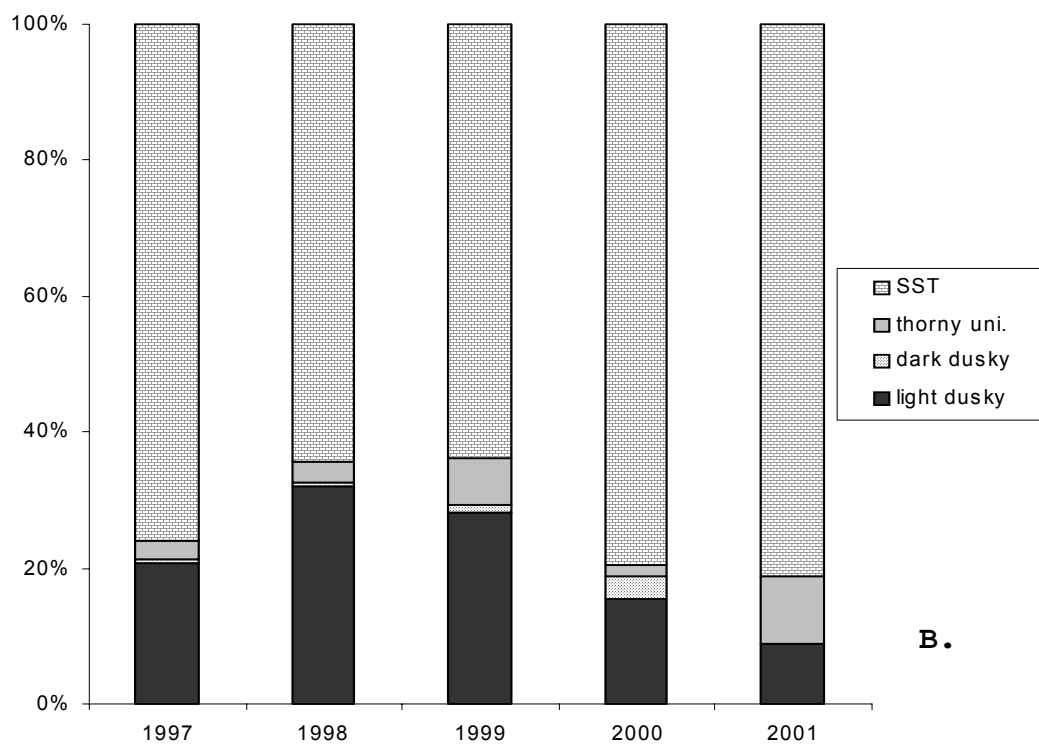


Figure 4. Catch distribution in the EBS of shortspine thornyhead from the A. AFSC research survey and B. Fishery.



**A.**



**B.**

Figure 5.

Proportion, from fishery data, of individual species catches to the total Other rockfish catch by year A. Aleutian Islands, B. Eastern Bering Sea.

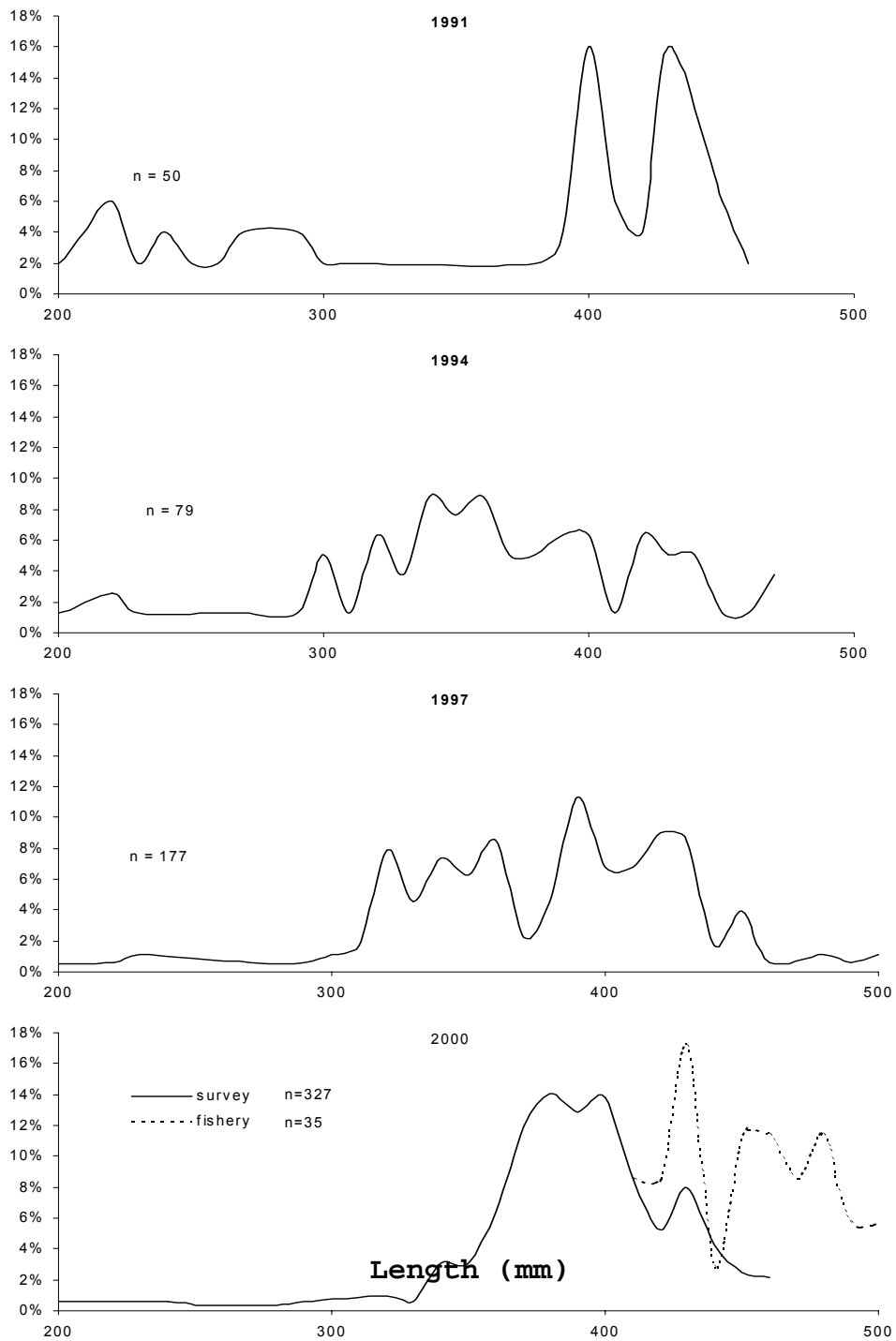


Figure 6.  
Length frequency for light dusky rockfish from the Aleutian Islands research surveys. Fishery data included when available. Source: AFSC RACE survey data.

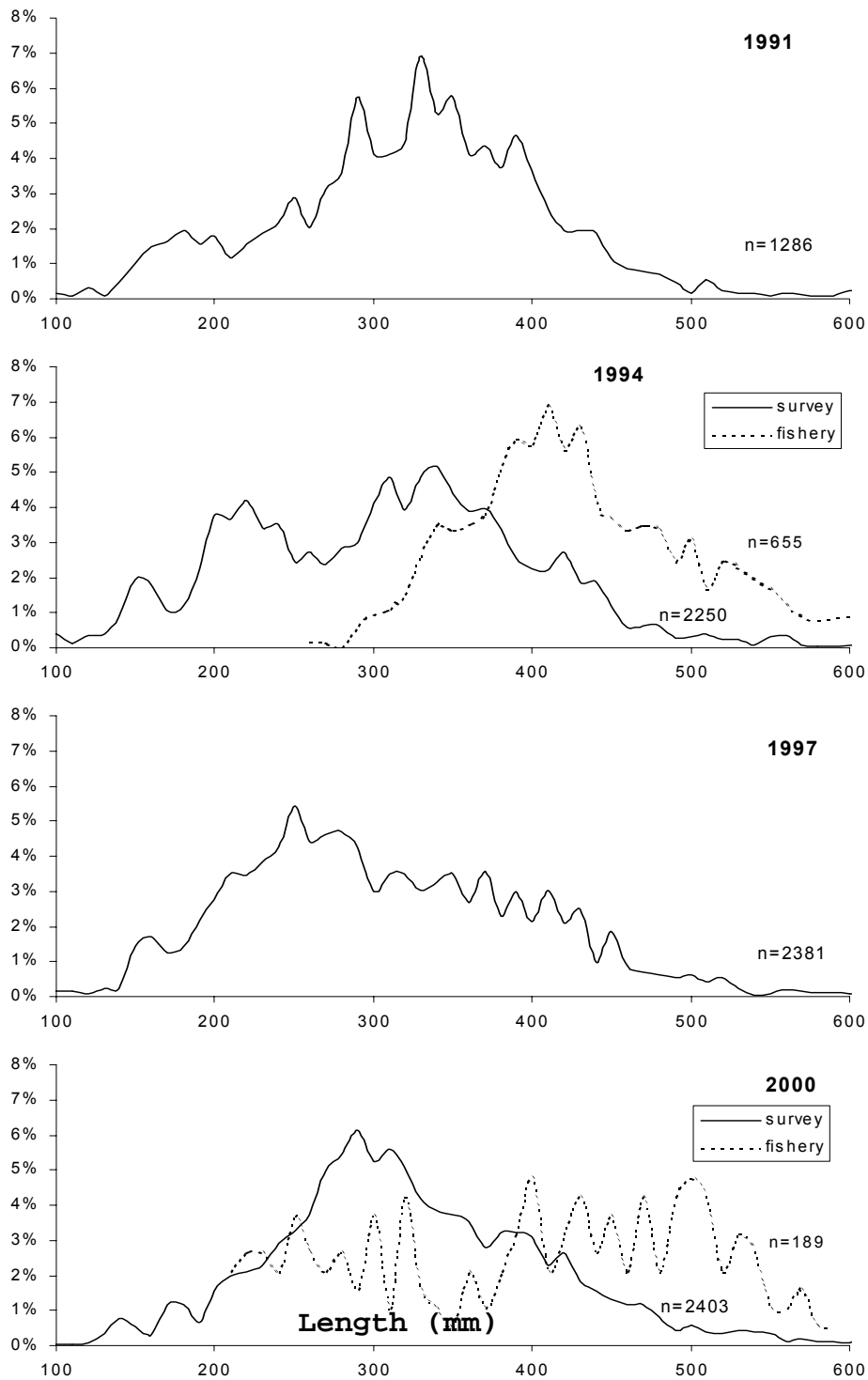


Figure 7. Length frequency for shortspine thornyhead from the Aleutian Islands research surveys. Fishery data included when available. Source: AFSC RACE survey data.

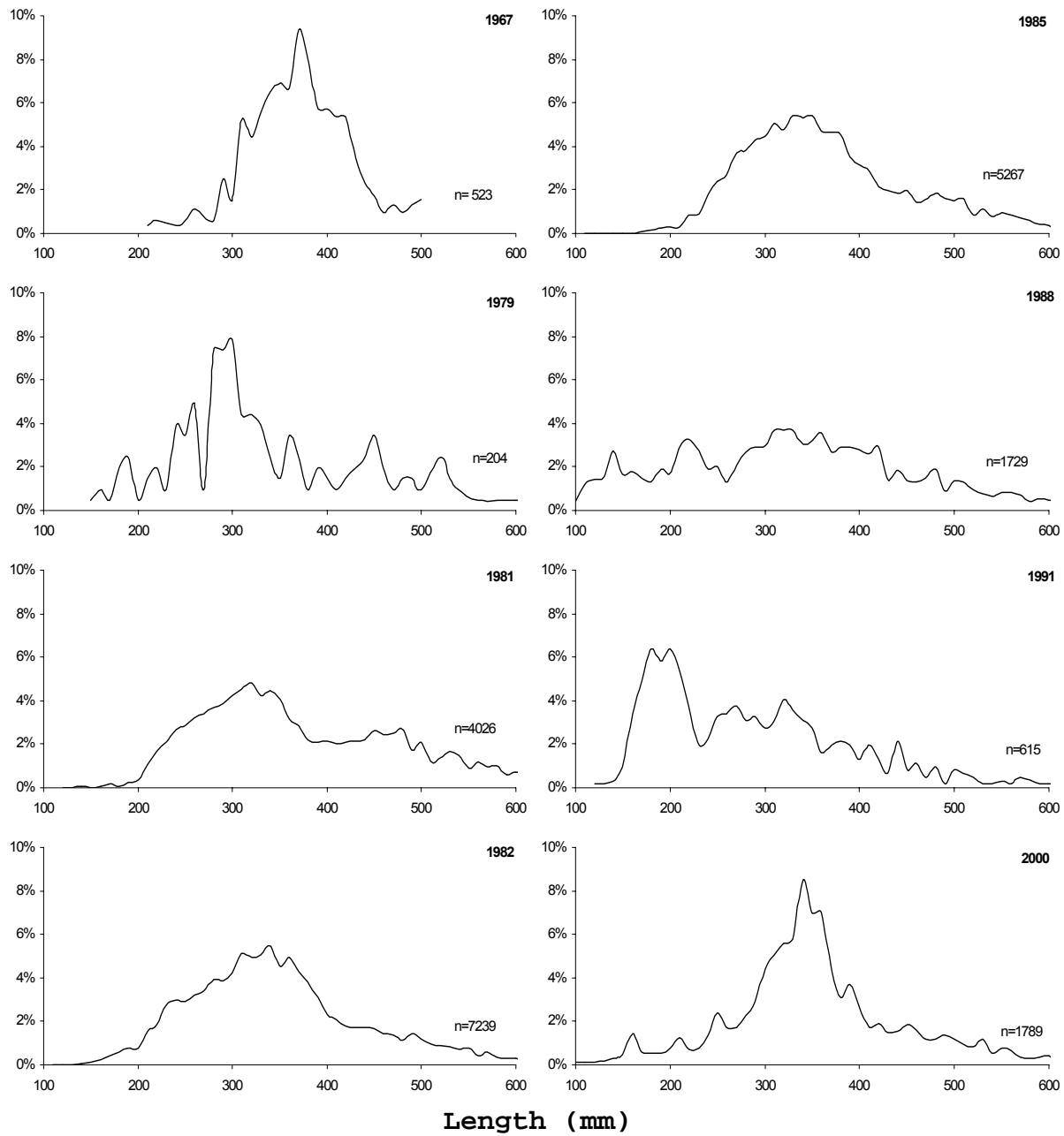


Figure 8. Length frequency for shortspine thornyhead from the Eastern Bering Sea research surveys. Fishery data included when available. *Source: AFSC RACE survey data.*

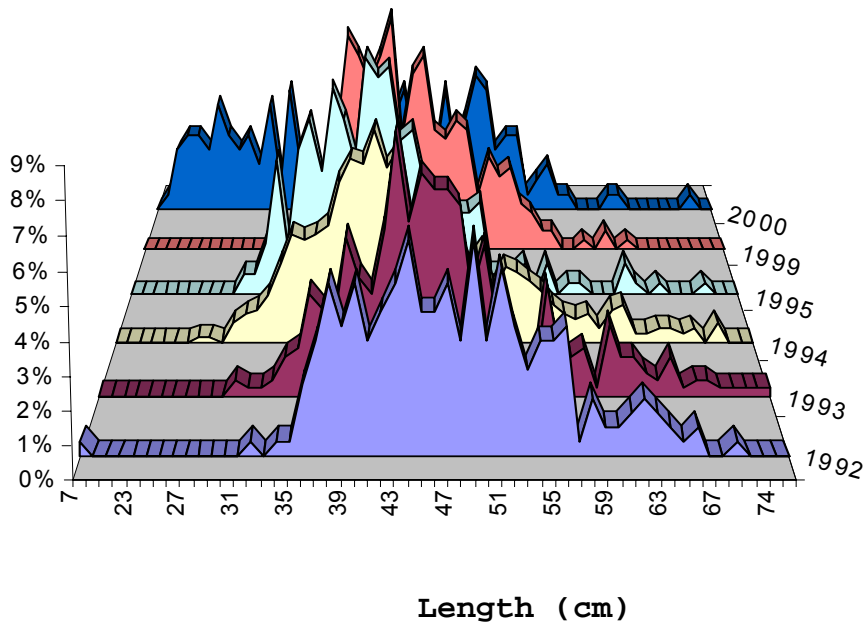
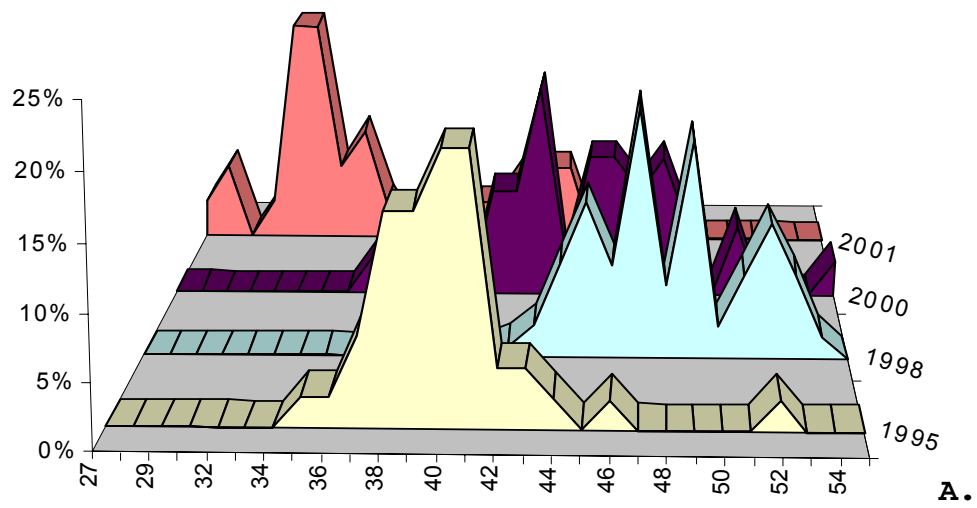


Figure 9. Length frequency of A. Light dusky rockfish and B. Shortspine thornyhead from fishery data in the Aleutian Islands. Source: NorPac Database AFSC Seattle WA.